LB1585
.M26 MTSA
v.5 No.3

Montana State Library
3 0864 1006 4540 0

MSTA

Montana Science Teachers Association

Volume 5, No. 3 September 1986

"Best Ever" MSTA Conference Meets in Bozeman October 16-17

The 1986 MSTA state conference will be held in conjunction with the MEA-IPD Convention in Bozeman on October 16 and 17. Other professional organizations that will also meet concurrently in Bozeman are: Montana Council for Social Studies, Montana Council of Teachers of Mathematics, Montana Art Education Association, Montana Council for Exceptional Children, and the newly formed Montana section of the American Association of Physics Teachers (AAPT). Teachers will have numerous choices for workshops, shows, lesson-demonstrations, and social hours.

Opportunities for teachers of science to meet formally and informally in Bozeman demonstrate MSTA commitment in support of science education and educators. **You are invited** to come, to learn, to participate, to enjoy!

A sampling of the featured MSTA events to be held at either Bozeman Senior High or Junior High includes:

—"Science, Pseudoscience, and Public Science," issues and perspectives on a new public science presented by Dr. Gerald Wheeler of MSU.

—Apple IIe Gameport Interfacing Workshop (limited to 20 teachers/day; preregister with Bob Briggs, OPI, Helena, MT 59620).

—"Stars and Stories" workshop (for credit) with Dorothy Starshine. (Preregistration is necessary. Contact MEA, 1232 E. 6th Avenue, Helena, MT 59601.)

—Lunar Rock Certification Program with Garth Hull, NASA/Ames Research Center.

—Special show on "The Yellowstone Grizzly" by Andrea and Kevin Rhoades.

—Workshop on lasers and holograms with Mac Rugheimer.

—Latest news and interpretations of Montana dinosaur finds, by Bob Makela.

—Multi-projector slide show on the Golden Eagle by Gus Wolfe.

—MSTA meeting for all members, new and experienced, on Friday afternoon.

—Social hour Thursday evening at GranTree Inn.

—Inaugural meeting and dinner of new Montana Section of AAPT on Thursday evening.

The MSTA Conference is your opportunity to get new perspectives on teaching science, to meet colleagues with similar interests, and to help build a consensus on the scope and direction of science education in Montana.

MSTA 1986 CONFERENCE
Bozeman, MT

ADVANCE REGISTRATION AND MEMBERSHIP APPLICATION FORM

Please print or type:

_____, _____, _____
Last Name First Name Initial

Address: _____, _____
Number and Street Phone Number

_____, _____, _____
City State Zip

Please check the appropriate box or boxes:

( )	Member Registration Fee	($ 5.00)	$_____
( )	Nonmember Registration Fee	($25.00)	$_____
( )	MSTA Membership Fee	($ 8.00)	$_____
( )	MSAAPT Membership Fee	($ 5.00)	$_____
		Total Enclosed	$_____

Check or money order payable to MSTA or MSAAPT must accompany this form.

Mail prior to October 1, 1986 to: Gil Alexander, 504 Dearborn, Helena, MT 59601.

How I Teach Biology

by Richard A. Menger
Baker High School
Baker, Montana

There's an adage in the business community which relates that 1 percent of the people make things happen, 9 percent watch what happens, and 90 percent ask, "What happened?" You don't have to teach for very long to know that there is more truth than fiction in this adage.

Most certainly, if you're trying to help children make things happen for themselves academically, teacher communication is a must. When our responsibility is to teach information and concepts that students don't know, the toughness of the communication is multiplied. And it goes without saying that, as a teacher, I must be among the 1 percent, for I must make things happen in my classroom.

The task of communicating is made easier if the teacher remembers to include three simple communication skills. First, my lessons are clear. Explaining something only one way won't do. That's not communicating; it's telling. I explain information or concepts in different ways, using a multi-media approach, because I want all students to understand. Second, I am concise. The longer the explanation, the less understanding. The attention span of people is short, and interests vary. Lengthy communication loses people quickly. Third, my teaching must be correct. The need to give accurate information is one of the biggest cases for making thorough lesson plans, rechecking information, and rehearsing instructions, lectures, and examples before I give them.

Though I try to teach biology to meet my students' needs for today, tomorrow, and to enrich their lives, children must function in the present and be able to cope successfully with today. If a child can't complete a biology assignment today, tomorrow's lesson won't seem very significant. Therefore, every daily lesson I plan is geared for today's success. In truth, some teachers forget this reality, and then wonder why some students aren't motivated to learn. My task is to pick students up academically where they are and take them as far as they can go. And never say, "You should have learned that last year." If a teacher does, many will quit before they start.

As a teacher, I am fully aware that I am the primary adult who helps the child to meet today's learning needs, become a successful learner, and discover how and where to gain knowledge. This is precisely the daily strategy I use to make today meaningful for students so that both today and tomorrow can be the best that they can be. I also realize that when I take care of today, tomorrow has the best chance of taking care of itself.

Montana Science Teachers Newsletter is published quarterly by the Montana Science Teachers Association and the State Office of Public Instruction.

Editor is Doris Simonis, School of Education, University of Montana, Missoula, MT 59812. Send her your activity suggestions, comments, articles, and news about science teachers and science education you'd like to share.

Subscription is $8.00 annually. Send your check, made out to MSTA, to Ken Price, President, MSTA, Helena High School, Helena, MT 59601.

Second Graders Build Houses for Bluebirds

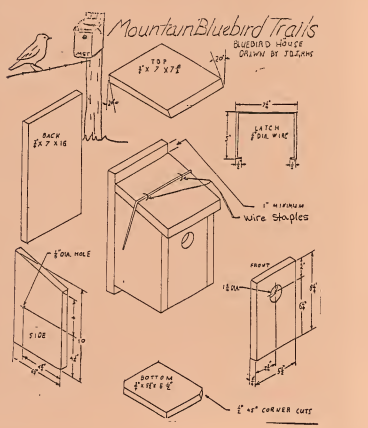
By Gary Kammerer
Plains Elementary School
Plains, Montana

As a follow-up to their study of endangered animals, the second grade students of Plains Elementary School took on the project of building special birdhouses for the Mountain Bluebirds which are beginning to make a good comeback in parts of Sanders County. These delightful birds have had their numbers reduced up to 90 percent in some areas of North America, mainly because they can't find enough places to breed successfully.

We were assisted by Art Lyleworth and Deni Hershberger who represent Mountain Bluebird Trails. This group has been constructing and placing bluebird houses in western Montana for 10 years, and they have been doing so with great success. Art Aylesworth supplied all the wood and nails needed to construct the houses and Deni Hershberger paid a visit to our school to talk with the students about the plight of the bluebirds and proper placement of the birdhouses. Norma Merritt and I combined our classes for a total of 38 students who were involved in the project.

With minimal assistance the second graders were able to build their own individual birdhouses, thanks in part to John Bauman (the Plains High School shop teacher) who let us use his facilities and also assisted the students in the actual construction. The birdhouses were very easy to assemble, with very few parts and easy-to-follow directions. The houses were placed in an open farming area west of Plains and within a few weeks bluebirds were beginning to inhabit some of them.

This was a very valuable "hands-on" wildlife conservation experience that still has the students talking. For anyone interested in finding out more about bluebirds, write to Deni Hershberger, 439 River Road West, Plains, Montana 59859.



Home with the Gold

Florence Kids Capture Top Science Awards

By Theresa Johnson
for the Missoulian, May 20, 1986

The Florence-Carlton Junior High Science team brought back two gold medals and a silver from the National Science Olympiad in East Lansing, Michigan.

A cheering crowd met the 15-member team at Johnson-Bell Field Monday night.

"For a small town it's really exciting," Jeanne Simmerman, the mother of one team member, said.

Ninth-graders Thane Mackey and Kenny Allwein teamed up to win top honors in the trajectory competition, firing a marble across a room to land within 9.9 centimeters of their target.

Mackey also won a drawing from among the 24 gold medalists for a $500 college scholarship from Honda of America Corp.

Another ninth-grader, Lorren Loveless, earned second place in the "Rocks to Riches" contest, scoring 96 percent on questions about different minerals.

Florence-Carlton scored 18th in a field of 28 junior high teams, and represented the smallest school in the competition. "Everyone had a super time," Coach Lee Holmer said. "Everyone competed and did their best."

Holmer said that some of the schools in the Olympiad have up to 3,000 students, and that one California school is a magnet school for science and math students.

He called the team's effort "outstanding," but said that next year he hopes Florence-Carlton will be one of the top 10 teams at the competition.

Tracy Summerfield, who with teammate Annette Plomaritis scored fourth in the "Science Search" event (a kind of scavenger hunt), said that the Olympiad was exciting, but that it was "hard to be that close and not get anything."

"I'm definitely going to go next year," she said.

The students took a two-day side trip to Chicago after the competition and visited the Field Museum of Natural History, the Museum of Science and Industry, and planetarium and aquarium.

Travel Workshops for Science Learning Announced by National Science Teachers

Four special opportunities for summer programs abroad in 1987 have recently been announced by NSTA.

1) Third annual "Summer in England," July 4-18, 1987, 4 graduate credits available, introduces teachers to contemporary British science education. Extensive visits to schools and science-oriented museums are part of the program. All inclusive costs $1799 from N.Y. For more detailed information, write Dr. H. Thier, 142 Hodges Drive, Moraga, CA 94556.

2) "Summer in Israel," July 18-August 3, 1987, 4 graduate credits available, takes you to Hebrew University, Tel Aviv University, and Weizman Institute for introduction to the best of contemporary Israeli science educators and education. Inclusive cost of $2195 from N.Y. For more information, write Dr. H. Thier, 142 Hodges Drive, Moraga, CA 94556.

3) Fourth Annual Science Workshop in the Galapagos Islands, Ecuadorian Andes, and coastal forest, July 11-23, 1987. Host scientist will guide participants in studies of the unique fauna, flora, and cultures of the region. One week on yacht, touring islands, is included. Total cost is $2457 (double cabin). For more information, contact Holbrook Travel, 3540 N.W. 13th St., Gainesville, FL 32609, 800-451-7111.

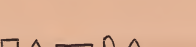
4) East Africa trip, July 12-29, 1987. Interdisciplinary studies of world-renowned national parks and game reserves throughout Kenya. Cost is $2457. For details, write or phone Holbrook Travel. (cited above).

Natural Shape Hunt

by Carolyn Drye
Kindergarten Teacher
Arlee, Montana

This activity will act as a culminating activity to our week of shape study at the beginning of the year. We spend the latter part of the week finding shape similarities in classroom objects, so this activity will be a "natural" extension.

I will make several sets of shape templates of all six shapes



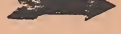
I will divide the class into groups of 3 or 4 and each group will get a set of templates to set out in a home area for that group. I plan to have help (mothers or older students) to help with this activity. Each group will find one natural object that is the same shape as each of its templates. We will do the shapes one at a time and one person in each group will be the "decider" for at least one shape. The children will place their natural items on top of the template that they think has the same shape. Sharing for this activity will be done by moving around to look at what the other groups found.

Questions

1. Did you see any circles (triangles, squares, etc.) that were the same in more than one group?
2. Which shape did you think was the easiest to find? the hardest?
3. Did you always agree with your "decider"? Why or why not?

Evaluation

1. The children will be able to find the six shapes in a natural setting.
2. The children will agree with and/or question other groups' decisions about the shape of a natural item.



Intermountain Junior Science and Humanities Symposium

The 25th Intermountain Junior Science and Humanities Symposium will be held on the University of Utah Campus, February 25-28, 1987. As in the past, we wish to invite your district's participation. Food, lodging and symposium expenses for delegates will be covered by the symposium administration. Travel expenses will be the responsibility of the delegate, school, or sponsoring institution.

Additionally, we will be able to accept a limited number of delegates who wish to attend and pay their own expenses. The cost will be $130.00 for students and $150.00 for teachers. As was the situation last year, "extra" or "paid" delegate reservations will be accepted on a first-come basis until all available slots are filled.

The Symposium is planned with the same format as in previous years. It will be an exciting program, with opportunities for delegates to visit several laboratories on campus and to hear eminent university professors present interesting lectures. Outstanding student researchers will have the privilege of presenting reports of their research efforts in competition for a trip to the National Junior Science and Humanities Symposium.

State science teachers will be notified in early fall with complete criteria for selection of Montana's official delegates. Information will be included for student application.

The criteria for student application will be as follows: a GPA of not less than 3.00; preparation of a research paper on their own individual projects, most of this project to have been completed by November 15; open to grades 10, 11 and 12.

The selection process is: 1) By November 15, science teachers must have sent to the Office of Public Instruction the research papers of all students who wish to compete for official delegate status. The cover sheet for the report should include the student's name, year in school, the name of the high school, the overall GPA, and the title of the research paper. All of the papers are to be as complete as possible. Additional work may be included in the paper that will be submitted to the Symposium by official delegates in January. 2) If a school submits more than one application, a rank order list could be provided by the science teacher to assist in the selection process. 3) A selection committee will review the papers and select the official delegates. The quality of the papers submitted will be the major criterion for selection. 4) Letters will then be sent to all participating schools informing them of the students from their schools selected as official and extra delegates with Symposium forms enclosed. These will need to be returned to Symposium officials by December 1. Should an official delegate decide at the last minute not to submit a paper, the funded official delegate slot will be awarded to an alternate with a paper. 5) Official delegate status for teachers will be awarded to schools having the largest number of official student delegates.

Any questions concerning the selection of Symposium delegates for this year should be directed to Bob Briggs, Science Specialist, Office of Public Instruction, Helena, Montana 59620 or call 444-4439.

Watch your mail for more information!!

Resources for Teachers

"Technology and the Information Democracy" supports the role of technology to advance knowledge. Free report is available from Gould, Inc., Dialogue on Technology #9, 10 Gould Center, Rolling Meadows, IL 60008.

★★★★★★★★★★★★★★★★★★★★★★

Teaching science, technology, and society topics in your classes? If so, you'll appreciate the *STS Reporter* from Science, Technology, and Society, The Pennsylvania State University, 164 Chambers Bldg., University Park, PA 16802.

★★★★★★★★★★★★★★★★★★★★★★

A new nontechnical information packet on becoming involved with astronomy as a hobby has just been published by the nonprofit Astronomical Society of the Pacific.

Whether you simply enjoy reading about astronomy in your favorite armchair or you have the urge to go out and explore the night sky for yourself, the 28-page packet has practical, "down-to-earth" advice about the steps to take, the books and magazines you can read (including recommendations for a basic library of astronomy), and local or national groups which can provide support and information.

A section on selecting a first pair of binoculars for skygazing, a clear basic glossary of astronomical terms, and a series of introductory articles on our modern view of the universe round out the illustrated guide. To get one, send a $3 donation to: A.S.P., Hobby Packet Dept., 1290 24th Ave., San Francisco, CA 94122.

★★★★★★★★★★★★★★★★★★★★★★

Teachers of almost every subject area will find interesting classroom activities in *101 Ways to Teach About Exponential Growth and Its Consequences*. This free book can be requested from Tri-County Teacher Evaluation Center, 426 School Street, Sebring, FL 33870.

★★★★★★★★★★★★★★★★★★★★★★

For a free poster on "The Joy of Birdwatching" featuring 14 kinds of U.S. birds, send a business-sized self-addressed STAMPED envelope (39¢ postage on it) to: The Joy of Birdwatching, Garden Club of America, 598 Madison Avenue, New York, NY 10022.

★★★★★★★★★★★★★★★★★★★★★★

Your written request on school stationery will result in a free book describing the history of U.S. moon programs. Write: U.S. Geological Survey, Text. Prod. Section, 604 S. Pickett Street, Alexandria, VA 22304.

★★★★★★★★★★★★★★★★★★★★★★

The Acid Rain Foundation has many resources available for teachers and classes interested in acid deposition. Materials include curriculum packets for grades 4-8 (interdisciplinary); curriculum packets for grades 6-12 (separate unit on life science, earth science, physical science, biology, chemistry, social science); resources directory of acid rain materials from around the world; information packets for different grade levels; rental audiovisual programs; t-shirts and gift items; posters.

For a free 12-page catalog, send a standard business-sized STAMPED, self-addressed envelope (#10 size) to: The Acid Rain Foundation, Inc., 1630 Blackhawk Hills, St. Paul, MN 55122 (612) 455-7719.

Pupil Behavior and Motivation in Eighth Grade Science

By Ann C. Howe

What motivates junior high school pupils to spend their time productively in science class? Does increased effort really lead to higher achievement? In order to study these and other questions we made systematic observation of the behaviors of boys and girls in junior high school science classes. In all the classes studied teachers used an activity centered approach to teaching with much of the time spent in hands-on or laboratory work. Our sample included an equal number of boys and girls and black and white students. In addition to observational data we obtained scores on standard reading and mathematics tests and used final class grade as the measure of achievement.

We defined three categories of behavior. Active Learning Behavior was defined as any behavior, other than reading or writing, directly related to the assigned activity. This included setting up equipment, carrying out an experiment, observing an experiment or discussing the work with a partner. The second category was Passive Learning Behavior—listening to the teacher, reading or writing. The third category was Non-Learning Behavior, defined as any non-task oriented or non-productive behavior.

Our first finding was that mathematics and reading skills are the most important factors in science achievement at eighth grade level. Boys and girls who have poor basic skills when they enter eighth grade are not likely to succeed even when the class is based on active involvement. We found that the next most important factor in science achievement was Active Learning Behavior. We found no race or sex differences in behaviors—an interesting finding in view of the assumption held by many people that girls are less active than boys in school and that black students' lower achievement is due to non-attention in class.

We found that reading and math scores and active learning behavior were related to achievement for all groups.

But what motivates pupils to be active in class in productive ways, to engage in Active Learning as opposed to Passive Learning or Non-Learning behaviors? Many researchers who have studied pupil motivation have based their work on the assumption that pupils will direct their efforts toward achieving goals that they value. Therefore, if pupils value success they will work to achieve it. In order to study this question we asked pupils to answer questionnaires to determine whether they valued success in school and particularly in science and whether they attributed success, when they attained it, to their own effort, to their ability, to the ease of the task or just to luck. Then we asked teachers to rate pupils on these variables and pupils responded to questions about their efforts, the level of difficulty and the environment of that class.

We found that pupils of both races and sexes *do* value success in science and that they believe their parents and teachers value it also. There was little to suggest, however, that valuing success is translated into effective effort in the classroom except for one group, the black boys. For that group positive correlations were found between value of success and Active Learning, between teachers' valuing success and Passive Learning, and a negative correlation between teachers valuing success and Non-Attending. Apparently those in this group who value success *themselves* engage in more Active Learning behaviors and those that think *teachers* value success engage in more Passive Learning behavior.

Two sex differences in casual attributions were found; boys attributed success more to effort. That is, boys think they succeed because they are bright and girls think they succeed because they work hard. There were no racial differences on this dimension. Many interpretations of this difference are possible, but we suggest the following. Attribution of success to ability is a sign of self-confidence, stronger in boys than in girls, that is not strongly related to actual ability and does not lead to more or less effortful classroom behavior. It is interesting that those who attribute success to ability do not attribute failure to lack of ability. Both attribution of success to effort and to ease of task are associated with increased Passive Learning, the traditional mode of classroom behavior. These pupils are "trying hard" by listening to the teacher and working on in-class assignments. Unfortunately for them, we did not find a relationship between Passive Learning and final grade.

Those who attribute failure to lack of ability do, in fact, have lower grades (i.e., they have more failure), lower SRA-Math scores (possibly a sign of lower ability) and engage in Active Learning less often. A similar pattern emerges for those who attribute failure to the environment (i.e., luck or other external forces). They engage in Active Learning less often, Non-Attending behaviors more often, and have lower SRA-math scores.

We had expected to find that those who attributed success to effort would engage in more Active Learning behavior (i.e., put forth more effort) but this was not the case. We did find, however, that those who attributed failure to lack of ability, or outside influences, engage in fewer Active Learning behaviors, as if to say "What's the use?" A suggestive finding was the negative correlations between the pupil's rating of difficulty of classwork and the teacher's rating of ability and effort. This suggests that low-achieving pupils see the work as too difficult but the teacher thinks they are not putting forth effort.

One unexpected finding was the lack of correlation between the teacher's estimate of pupil ability and the pupils' perception of the teacher's rating. This may indicate a lack of honest communication on the part of the teacher and could result in frustration for the pupils. The failure to find a siginificant correlation between value of success, attribution of success to effort and actual effort may be due to adolescents' inability to make the connection between the present and the long range future. If this is the case, teachers need to help their pupils make that connection by being more explicit in expressing their expectations and more straightforward in evaluating pupil progress.

This work was carried out by Dr. Vernon Hall, Syracuse University; Dr. Norman Lederman, SUNY-Albany and Dr. Ann Howe, North Carolina State University. Drs. Howe and Lederman are active members of the National Association for Research in Science Teaching, *an organization that seeks to improve science teaching through research. NARST has provided this column for our newsletter.*

And I Felt... Nothing

by Joseph D. Ciparick

Morales's song is one of the saddest in the musical "Chorus Line." She felt nothing when asked to feel like a bob-sled going down a hill or a melting ice cream cone. Her teacher, Karp, reprimanded her because she felt nothing. After all, these were standard exercises at Music and Art. She *must* feel something. She made it despite Karp, and when he died, she cried. But she felt...nothing.

There's lots of talk about quality education and getting back to basics. Science teaching must be improved and talented teachers attracted to the schools.

Precollege Syndrome

In the late 1950s, when a reform in science teaching was called for, the answer was an unequivocal, "Let's teach more..." and teachers had to go back to school to learn topics they had never heard of in college, even if they had studied science. Grand textbooks, hundreds of pages long, were cloned; syllabi that would bedazzle a graduate student proliferated. And for what purpose? To prepare students for college courses.

High school became "precollege," a mere stepping stone with courses designed by university professors. No more of the old describe a blast furnace course in chemistry. Now it was the latest: orbitals, enthalpy, entropy, Bronsted acids and bases. Ten or more major topics had to be covered if students were to take the state Regents or national standardized exams.

Junior high became "pre-high school" and seventh graders had to learn all about atomic structure and bonding. A hodge-podge of anthology general science courses sprung up to prepare the students for the precollege course in high school.

No matter what a student was going to study in college, to have a decent transcript, a good mark in precollege science was a must. Thousands suffered through hodge-podge, and hated chemistry and science in general. Most were turned away altogether because of the reputation the courses had, and they ended up with a one-year anthology course at best.

The result? We have an elitist system that cuts students off in the sciences at various stages. They never really learn what science is all about. Those that are forced to take the precollege courses never really learn what science is all about either, unless they continue in college.

Personal Reflection

I'm a sad situation. I feel like Karp, and despite all my efforts I know that my students feel nothing many times during the year. I happen to be teaching highly motivated minority students who are really trying to feel something, and when they don't, they tell me. Upon reflection, I realize that no matter what kinds of students I've had over the past 25 years, most of them probably felt nothing too, but never admitted it.

Whenever there was a response and real interest, the topic had to be terminated. We had to move on in order to cover the 11 or 12 units left before the final exam in June. Electrochemistry or combustion evoked a positive response, but such studies were cut short because we must all learn about electron distribution in s, p, and d orbitals. The fascinating world of acids and bases had to be left behind in order to confront a world of Bronsted definitions. The list goes on and on.

No matter how many good experiences the students had, there was the overall nothingness of the final exam. There was no way to communicate what they had really learned. It was all pretend, as they learned formulas and techniques, and tried to recognize various question patterns. Some failed, and were depressed. Some passed—and they felt nothing.

Students who are honest (mostly girls) admit that even though they may have passed chemistry, they didn't understand it at all. The boys were not dishonest: they probably don't think they should admit their lack of understanding.

Quite naturally this situation has resulted in a crisis in education and science teaching. The solution? Train the teachers. They are responsible for it all. And I've attended institutes where—you guessed it—I felt nothing. It was more of the same; how to teach orbitals, new approaches to equilibrium, thermodynamics made more dynamic. Again, each topic was fine by itself, but do they all have to be covered?

Building a Foundation

"No fact in science is worth teaching" is a statement to think about. Is science knowing a lot of facts—many of them unrelated—or is science a way of thinking? Can a curriculum with 11 major topics ever give students the chance to think as scientists do? The answer is implicit: "Some day they'll get a chance. Right now you're just laying the foundation."

Of course, most don't get the chance, and the foundation ends up just that: a gaping hole in the ground with a few half-built walls that will soon be covered with weeds. In a word: nothing.

Maybe our metaphors govern our decisions. Foundations are always incomplete and ugly. A growing plant, animal, or human being is not. Can courses be designed with the organic metaphor in mind, rather than the mechanical?

Of course they can. Just take any of the topics, and follow through: reinvent the wheel, make the observations that support the theory, and don't present the theory until it's needed. See what had to be done in the past to arrive at where we are today, and learn about the actual human beings involved. This is certainly one area that is completely neglected today. Collection-of-facts syllabi leave no room for the humanistic side of science, and this is the greatest fault of all.

There is one advantage to the fact programs: They can be easily tested. That couldn't be the reason we teach these courses. Of course not.

Is it time to blow the whistle? Should we tell the emperor he is stark naked? What do the new clothes of atomic theory in chapter two really mean? What evidence do we have? Or don't we need any evidence, because all we are really doing is outlining another topic for the examination.

Broader View

Bits and pieces of the standard curriculum have been attacked and criticized, but never the whole program. Maybe it's time to look at the total picture; at the cloned textbooks that are nothing but a burden or a crutch. Problem solving becomes a mish-mash of crossed out factors and formulas about to obliterate reality. But if we follow the text, the students will pass the exam. They won't learn science, but they'll pass.

I don't think I'm being unduly sensational in my criticism. If we would just stop and think of what we are doing, and forget the convenience of the syllabus, we might see where we are going astray. The fact is that science education is not at its zenith. Criticism of the system by experts produces no results. My students still suffer feeling nothing, and they will for years to come.

What we have now is convenient, easy to teach, and easy to test. No demands are put on the individual teacher. No choices have to be made. No insights are demanded beyond what is in the textbook or syllabus. Talents that can never be examined—insight, the human dimension, creative imagination—are never stressed. Teaching such themes demands a year-to-year evaluation. There is no outline.

"No fact in science is worth teaching." There are no lists of facts that high school students must master before they can go on to the real thing. Any topic studied in depth can open up the world of real science, which will be the true foundation for future study. It's the way of thinking that counts, not the facts amassed. But that's not the way the system works at the moment, and no one seems to be doing anything about it.

Joe Ciparick teaches chemistry at the Manhattan Center for Science and Mathematics in the East Harlem section of New York City.

Reprinted with permission from *Chemunity*, an ASC publication, 1155 16th St. NW, Washington, D.C. 20036.

Name That Bunch

If you saw cows grazing together in a field you would have no problem in describing the group as a herd. Or, if the animals were sheep, you would likely refer to them as a flock.

Here are some other terms to designate certain groups of animals:

SLOTH of bears	WEDGE of swans
CLUTTER of cats	KNOT of toads
SEDGE of cranes	RAFTER of turkeys
DULE of doves	BALE of turtles
DRIFT of hogs	GANG of elk
COMPANY of parrots	SKULK of foxes
POD of seals	TRIP of goats

NJSTA Newsletter

National Bison Range Offers Ecology Workshop October 25

The annual fall education workshop for Montana teachers will be held at the National Bison Range on Saturday, October 25, 1986. The purposes of the workshop are: 1) to introduce teachers to ideas for using the outdoors as a classroom; 2) to introduce teachers to persons currently involved in outdoor education programs and willing to share skills and materials that have been successful with their students; 3) to demonstrate advantages of the Bison Range and the Pablo and Ninepipe Wildlife refuges as sites for outdoor classes; 4) to familiarize teachers with resources and materials available for environmental education.

As usual, the program will have a variety of seminars and activities related to local ecology, some of them offered for the first time. Participants may select those most appropriate for their teaching area.

Registration forms and more detailed information are available from Marcy Bishop, National Bison Range, Moiese, MT 59824 (phone: 644-2211) or Michael Malouf, Continuing Education, University of Montana, Missoula, MT 59812 (phone: 243-2900).

New Winter Science Activities

Tired of being cooped up inside your classroom with restless adolescents all winter? A group of teachers and scientists in upstate New York are developing new cold weather science activities with support from the National Science Foundation. The Winter Science Curriculum Project (WSCP) needs teachers to test and evaluate these new investigations in winter 1986-87.

The new activities focus on physical and life science topics that can best be investigated in cold weather. They are designed to replace traditional laboratory experiences in general, physical, earth and life science courses at the middle and high school level. All investigations use a discovery or problem-solving approach, and most are appropriate for use in urban as well as rural schools.

A small stipend is available to teachers in northern USA and Canada for testing and evaluating these activities in the classroom. To receive a description of the activities and an application to participate in the WSCP evaluation program, wite to Suzanne Weber, Winter Science Curriculum Project, Piez Hall, SUNY-Oswego, Oswego, NY 13126.

Jack and the Soybean Stalk

Perhaps a modern explanation for the amazing size of Jack's fairytale beanstalk can be found in *brassinolide*. This remarkable chemical is an extremely effective plant hormone that can double the growth of food plants, by both cell elongation and cell division. Only recently have chemists been able to isolate, identify, and then synthesize this valuable substance so that it can be used to increase the world's food supply.

Plant hormones have already revolutionized agriculture. They allow us to coerce cotton plants to release their cotton balls at harvest time, command fruit trees to cling to their fruit, induce Christmas trees to keep their needles, and order stored potatoes not to sprout. *Brassinolide* now can add to this list, and it is active in quantities of less than one-billionth of an ounce!

Chemists play a crucial role along the long and arduous research road from discovery to use of a new plant hormone. For example, *brassinolide* is found in minute quantities in the pollen of the rape plant (*Brassica rapus L.*). To isolate enough chemical to study, researchers laboriously collected pollen brushed off the legs of bees who had been cavorting in the rape plants. From 500 pounds of pollen so gathered, chemists were able to extract only 15 milligrams of *brassinolide*, an amount as small as a grain of sand. From this they were able to grow a single tiny crystal, so that a chemical crystallographer could analyze the molecular structure with X-ray diffraction. Just as X-rays penetrate an arm to reveal broken bones, they penetrate a crystal and reveal the geometrical arrangement of the atoms in *brassinolide*. The chemists were surprised to discover an unprecedented seven-atom ring within the molecule, a feature that must be essential to the function of this beneficial compound. With this key information, synthetic chemists have now made several close relatives of *brassinolide*, and agricultural scientists are evaluating them in greenhouse production of potatoes, soybeans, and other vegetables.

This advance involved the knowhow and interaction of plant and insect physiologists, organic chemists, and chemical crystallographers from many different laboratories. It shows that mental effort is as good as magic beans.

Maybe better, Jack!

From Chemunity, April 1986, a quarterly publication of the Office of Precollege Chemistry, American Chemical Society, 1155 16th St. NW, Washington, DC 20036.

If one were to design a system and a workday that would virtually guarantee isolation from one's colleagues and be devoid of intrinsic professional rewards, one could hardly find a better model than that experienced by the typical teacher.
(Adam Urbanski; Vice President, American Federation of Teachers)

Elementary Science Teaching Idea

"Crystal Creations"

by Denise Hilyard

Have you ever tried to catch snowflakes on your tongue or stopped to examine frost on a window? These lacy bits of frozen water are quite small, yet they are made up of even smaller bits of frozen moisture called snow crystals. Take the nip off of winter learning with some crystal creations of your own. "Crystal Castles" are easy to make and fun to observe.

In a glass or plastic bowl, put pieces of coal, coke, porous brick, tile or small pieces of cement or sponge. Place the bowl on a protected surface.

Mix together two tablespoons of water, two tablespoons of table salt, and two tablespoons of liquid bluing (available in the laundry aisle at your supermarket). Pour this over the contents of the bowl, let stand overnight. The next morning sprinkle two more tablespoons of salt over the base.

On the third morning, mix together two tablespoons each of salt, water, and bluing; pour into the bottom of the bowl (not directly on the base material). By this time a beautiful flower-like growth should have appeared. If not, it may be necessary to add two tablespoons of ammonia. For color, sprinkle a few drops of Mercurochrome, vegetable food coloring or ink over each base piece.

The addition of toothpicks placed randomly on your base piece will create some interesting effects.

Have students predict what will happen in this unique mixture. Encourage the students to observe, compare, predict, measure, and record what they "experience" as the Castle begins to grow. Older students can be encouraged to write descriptive poems or essays about these "Crystal Castles."

From N.U. Science Teachers Newsletter, *December 1985.*

Over 8,000 Postcards Retrieved from May 12 Balloon Launch

Over 8,000 bright yellow postcards dropped from the sky to various places in the U.S. during May, revealing some of the flights of over 180,000 helium-filled balloons that were launched on May 12 as part of a nationwide science demonstration.

The early record holders are two balloons which each went an astonishing 700 miles, one from a Portland, Oregon launch site over the Rockies to a landing near Billings, Montana, and the other from Wichita, Kansas, to Talladega, Alabama. Preliminary analyses (see attached map) also reveal long balloon flights from Glen River, Wyoming to southeastern North Dakota (666 miles), from Rolls, Texas to southcentral Louisiana (648 miles), and the longest "eastern" trip, 340 miles from Detroit, Michigan to western Maryland. (The identities of launchers and finders will be available at a later date.) Since it is quite likely that none of these flights were straight line, total flight paths were probably considerably longer.

Other balloons have provoked comments ranging from a concern about the extraterrestrial to an invitation to exchange letters from a 6th grade boy in Berea, Kentucky to a balloon's launcher, a Danville, Kentucky girl. (The boy included a picture of himself with the returned card.)

While jogging, a Middlebelt, Michigan man caught a drifting balloon which had been launched in Detroit. And a New Jersey mother wrote, "My son was amazed that experiments such as this are done in school. I showed him the distance the balloon flew from Newburgh, New York. His first science lesson!".

A senior citizen in Westland, Michigan saw a balloon in the woods behind her house and enlisted the help of a neighbor to shoot it down with a BB gun. And a Garden City, Michigan junior high school student, Michelle Brown, who found a balloon launched by second grader, Otis McDonald, in Detroit, wrote to the boy: "Remember this, a good education is one thing no one can take away from you. Your future is what you make of yourself."

Numerous other messages about finding the balloons were sent by other finders to the launches via the return postcards.

The Washington, D.C. based Triangle Coalition for Science Technology Education sponsored the launch, which took place on the first day of National Science Week. The balloon launch is designed to teach air currents, demography, predictions, and more.

For example, the balloon launched in Portland, Oregon had to reach a height of at least 10,000 feet in order to go over the Rocky Mountains on the way to Billings. At West Sylvan Middle School in Portland the balloon's launcher, Andrew Gross, and his classmates will now study the easterly winds at that altitude and in that region for May 12 and 13. They will be able to draw numerous conclusions and use their other skills, such as mathematics.

Finders are mailing postcards to the National Center for Earth Science Education at the American Geological Institute (AGI). Cards from a nationally distributed sample of 50 or so launch sites have been analyzed by the Geographic Name Information System, National Mapping Division of the U.S. Geological Survey. A map of these preliminary results is attached. A similar map along with wind patterns on May 12 will allow further study of the balloon travel.

This fall, teachers at the more than 800 launch sites will receive the returned cards and the analysis with instructions enabling them to perform similar analyses with their students.

Several Montana schools participated in the balloon launch this past spring. The press picked up stories at several schools and included pictures. Some even made the front page.

Balloon Launch Results to be Used by Colorado State University

The Triangle Coalition for Science & Technology Education National Balloon Launch on May 12 is becoming part of a research project at Colorado State University which is studying wind currents in the lower and middle troposphere (the air between the earth and the stratosphere).

From the 180,000 balloons the Triangle Coalition launched to open National Science Week '86, cards have been returned on approximately 8,000 of them indicating their flight paths.

In the past, weather scientists assumed that balloons would travel in the direction and at the speed of the winds estimated in a given area. The National Weather Service releases radiosonde balloons twice a day from numerous locations across the U.S. These large balloons radio back data to the National Weather Service regarding winds aloft.

However, Roger Pielke, a Professor in the Department of Atmospheric Science at Colorado State University, says the winds in mountain valleys, at squall lines, and even in individual cumulus clouds, vary more than the National Weather Service balloons indicate. Therefore, the results of the balloons launched on May 12 will help Pielke determine when, and by how much, local winds differ from a more uniform large scale wind field.

Professor Pielke's research will also yield a bonus for teachers who participated in the balloon launch. Pielke will share his data with them to further enrich what their students can learn in conjunction with the balloon launch.

Last Minute Bulletin....

Craig Kuchel, from Florence-Carlton High School, has been selected by the White House as Montana's $5,000 Presidential Award winner. Congratulations Craig. Other Presidential Award winners are Larry Fauque, North Toole County High School and Gary Swant, Powell County High School.

Would You Know If You Had One In Your Class?

Anand Atal
Science Department Head
Burnaby South Senior Secondary
Burnaby, Canada

There are virtually tens of thousands of living 'scientists' in the world today. In fact, it is not an exaggeration to say that the number of scientists alive today may be more than all those who have lived ever since we began an organized study of science. However, of all these, the number of truly outstanding scientists is small indeed. How many of these outstanding ones showed great promise as children? More important, how many of them were recognized as superior ability students by their science teachers? Did they show talent in high school that was recognized and reinforced by their schools and families?

In this province there is an increasing talk about the Ministry of Education making 'extra-funds' available to the school districts to promote enrichment of the superior ability students. This may sound too good to be true in these days of crises and cutback. However, the underlying message is clear and unmistaken. The schools are not widely perceived to have done enough for our superior ability students to meet their special needs for extra stimulation and challenge. My own experience in the school system tends to bear it out.

Gandhi once said, "A good teacher does nothing to stifle the learning of his students." How many teachers can lay claim to have never violated this advice?

Average Classroom Teacher Too Busy

Teachers today are generally too busy dealing with day-to-day chores and routines. Their nose is too close to the grinding wheel of almost never-ending tasks such as dealing with 'problem' students, sending memos (or responding) to the office, preparing lesson-plans, making tests, marking, putting marks in the markbook, dealing with students who have missed a test or a lab, and attending lunch-hour/after school meetings. Science teachers may also add preparing and marking labs. Larger than normal class size adds extra workload, something quite hidden but very real to the teacher in a system that counts workload in terms of teaching blocks only. I know of teachers so busy running around during the day that they will be lucky to sit down to eat their lunch properly, let alone have time to relax, meaningfully relate to their colleagues, and to focus upon the long term directions for their students.

Does an average science teacher have time to recognize the hidden potential of a budding future scientist sitting in the class in front of him almost every day?

The other day my daughter Ami brought home two books about the life and work of Einstein from the school library. Her grade 4 science teacher had aroused her curiosity about the man. These were books you will normally find in an elementary school library. I had a chance encounter with these books and once I began it did not take me long to finish them. This gave me a new unprecedented insight into Einstein's personal life, his political affiliations, and scientific contributions. Here was a man whose theory of relativity has fascinated me for years, and that I teach to my Physics II students. After reading the book, a thought has nagged me for some time and often. Would I recognize another Einstein, if I had one in my present physics class? The answer, in my own mind, has been vague and discomforting.

Educational Grant Awarded

Judy Bozler has been awarded a $600 educational grant by the American Association for the Advancement of Science (AAAS) to be distributed statewide by the Montana Academy of Science (MAS). The grant is to encourage secondary school students to do research for the year 1986-87. The AAAS specifically awarded the money in hopes that it would serve as "seed money" to attract additional funds and attention to our efforts to involve young people in scientific research. Judy asks state businesses interested in donating money to contact her at Sentinel High School, Missoula (728-2403) or at 2320 West Summitt, Missoula, MT 59803.

Students wishing to apply for a maximum of $100 need to send a short research proposal plus cost projection to Ms. Bozler by October 15. The MAS scholarship committee will make selections by November and monies will be distributed by November 15. Students selected will be asked to present their research at the spring convention of the MAS. "We, the academy, are hoping that this grant plus our scholarship program for high school students will encourage students to enter into scientific endeavors."

Van Allen Deplores 'Misty-Eyed Concept'

Space pioneer James A. Van Allen says America's "ill-considered and fruitless" manned space flight program should be suspended indefinitely in favor of unmanned space flights.

Writing in the May 30 issue of *Science*, a publication of the American Association for the Advancement of Science, the Carver Emeritus Professor of Physics and Astronomy at the University of Iowa characterized the current space program as a "misty-eyed concept that the manifest destiny of mankind is to live and work in space."

Van Allen, best known for his discovery of the Van Allen radiation belts, writes that current problems afflicting the U.S. space program go beyond the January 28 explosion of the Challenger to include erroneous notions of what the goals of space flight ought to be.

He further writes that the U.S. space program is being damaged by the premature advocacy of such futuristic proposals as: solar power satellites; manufacturing in space; permanently manned space stations in earth orbit, on the moon and on Mars; and the economic mining of asteroids.

"Despite the great successes and future promise of automated, commandable, unmanned spacecraft in providing vital human services and scientific advances, the president and Congress persist in giving primary emphasis to the misty-eyed concept that the manifest destiny of mankind is to live and work in space," Van Allen says. "The proposed development of a system of permanently manned space stations serves this concept but is otherwise poorly founded.

"If such a development is pursued as directed by the president two years ago, many of the much more worthy undertakings in space will languish for lack of support."

Van Allen cites such worthy undertakings as: satellite communications; lunar, planetary, and cometary investigation; and remote sensing of the earth's resources, oceans, and weather.

He points out that, in evaluating the U.S. space program, it is difficult to avoid mentioning the stark contrast between success and failure that took place in January—between the brilliantly successful encounter of the unmanned Voyager 2 spacecraft with Uranus and the Challenger disaster.

"In the arena of national space policy, I am deeply distressed by the dissipation and misdirection of our immense technical and human resources on enterprises that appeal to persons of a science fiction mind-set but are otherwise ill-considered and fruitless," he writes .

To improve the space program, Van Allen proposes the following:

- Suspend manned flight indefinitely pending critical assessment of its justification.
- Postpone development of the space station.
- Resume production of previously well-developed expendable launch vehicles such as Scout, Delta, Atlas, Centaur, and Titan and upgrade their performances progressively.
- Seek lower-cost launching techniques.
- Emphasize advanced applicational and scientific work.
- Recase the structure and the public image of NASA to those of an agency whose primary purposes are to develop space applications of widespread human importance and make major advances in human understanding of the great universe within which we are privileged to live.

—Gary Galluzzo

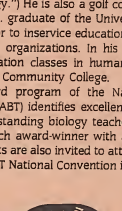
In the *University of Iowa Spectator*, June 1986.

Richard Menger is 1986 Honoree: Montana Outstanding Biology Teacher

Baker High School biology teacher Richard Menger was selected this summer as the "Outstanding Biology" teacher in Montana. All nominees for this year's award were highly qualified, reports State OBTA Director Craig Kuchel. "Mr. Menger's selection as the award recipient is indicative of his valuable contribution both to the education profession and to his students."

Richard teaches four biology classes and two horticulture classes every year. (See March 1986 *MSTA Newsletter* for details on his "Green Jeans" initiatives and this newsletter for his article, "How I Teach Biology.") He is also a golf coach and Fallon County sanitarian, an M.S.T. graduate of the University of Montana, and an active contributor to inservice education for colleagues and to several professional organizations. In his "spare time," Richard teaches adult education classes in human physiology and horticulture at Dawson Community College.

The annual award program of the National Association of Biology Teachers (NABT) identifies excellence in biology teaching by selecting an outstanding biology teacher in each state. Silver Burdett presents each award-winner with a "world-class" pair of binoculars. Recipients are also invited to attend a special luncheon held during the NABT National Convention in Baltimore, MD in October 1986.



Montana Science Teachers Association
Application Form

Name _____
City _____
County _____
Business Address _____
_____
_____
Home Address _____
_____

Grade Level	Grades Taught	Subject Area
☐ Elementary	_____	_____
☐ High School	_____	_____
☐ College	_____	_____

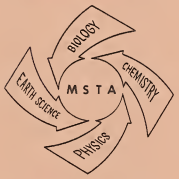
MSTA will help the individual participate in determining the destiny of science education in Montana. The organization serves as a vehicle for educators from all professions to exert positive influences on young people. Many important decisions concerning the scope and direction of science education will be strongly influenced by our organization.

The MSTA goals are to increase public awareness, interest and support of science education in Montana.

Membership Dues are $8.
Make checks payable to:

MSTA
Ken Price, President
Helena High School
Helena, MT 59601

Montana Science Teachers Association



Dedicated to quality science education

Office of Public Instruction
Ed Argenbright, Superintendent
State Capitol, Room 106
Helena, MT 59620